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Hospitalization Utilization & Communication in Hypoglycemia: An Inside Look at Emerging Data

Dr. Anderson:
Hypoglycemia is one of the most common complications of diabetes treatment and can lead to serious side effects. To better understand the scope of this complication, we'll be taking a look at two studies exploring hypoglycemia in patients with diabetes.

Welcome to *Diabetes Discourse* on ReachMD. I'm Dr. John Anderson, and joining me today to share his research on hypoglycemia in patients living with diabetes is Dr. Scott Pilla, an Assistant Professor of Medicine at Johns Hopkins University School of Medicine.

Dr. Pilla, thanks for being here today.

Dr. Pilla:
Hi, happy to.

Dr. Anderson:
So, to start us off, let's take a look at your study on hospital utilization for hypoglycemia among patients with type 2 diabetes. Scott, what inspired you and your colleagues to dive into this area, and what was your objective?

Dr. Pilla:
Hopkins is one of the sites for a group of data in the PCORnet group. This is, a group of hospital systems that are sharing electronic medical records and other data for research purposes, so it's actually six different health systems, so we have really a wealth of data to look at what are the major outcomes that are happening in patients. So, the data that we focused on in this study was hypoglycemia that results in hospitalization, so patients arriving in the ER because of hypoglycemia or patients being admitted to the hospital. Our focus in the study was to understand, how often that happens, how much that's changing over time, and which are the patients that are at the highest risks.

Dr. Anderson:
So you've got a robust database. What period of time were you actually looking at during all of these hypoglycemic event hospitalizations or ER visits?

Dr. Pilla:
Yeah, that is a great question. So our database covered the time period from 2009 to 2019, and part of that actually created an interesting opportunity for us because the way you measure hypoglycemia kind of changed over that timeframe. So, when we look at hospital utilization for an outcome, the way we ascertain that outcome is using a diagnosis code, so ICD codes. So, in the 2014/2015 timeframe, we changed from ICD-9 to ICD-10, which is the latest version of the ICD codes. And, you know, in ICD-9 there were, like, a few codes for hypoglycemia. In ICD-10 there were dozens of codes, so it became a lot more specific but also a lot more complicated. So we kind of looked at, you know, how the transition to the different kinds of coding system, you know, gave us an understanding of how much hypoglycemia was occurring.

Dr. Anderson:
When you looked at these datasets in these ICD-10s, in retrospect, do you think you were pretty accurate at capturing what was, you know, severe hypoglycemia?

Dr. Pilla:
It's really a complicated question because, you know, when patients show up in the ER, they show up for a lot of reasons, and

hypoglycemia by itself may be just one component of something else that's going on. You know, for example, if someone has a severe infection they might become hypoglycemic as a result of it, and they might show up in the ER, they might have an infection, and they might have hypoglycemia at the same time. So, what was the cause, and what was due to hypoglycemia? Sometimes it's hard to parse. The way that we did it in the study was that, if they had any of their diagnosis codes—you know, diagnosis codes like 1 through 5 for, for hypoglycemia—and they were in the ER, then we said that, you know, hypoglycemia was part of the reason that they wound up in the ER, which seemed fair. But overall we think we did a decent job of capturing it.

Dr. Anderson:
So, Scott, how did you define hypoglycemia and the severity?

Dr. Pilla:
Yeah, so one of the things to remember about this study is that we are looking at just the tip of the iceberg, the hypoglycemic events that result in hospital utilization, but hypoglycemia is such a big problem, and it affects people in a lot of different levels. So the most common way people experience hypoglycemia who have diabetes is they, you know, just have symptoms where they don't feel well they feel dizzy or shaky, and they check their blood sugar and it's low. There's actually more hypoglycemia going on that people don't even experience. So, if you put a continuous glucose monitor, a CGM on somebody, you measure a lot more hypoglycemia than people are actually experiencing, and that might be causing problems in and of itself. Even asymptomatic hypoglycemia could be associated with bad outcomes but what you can measure through a CGM and what people are experiencing as mild hypoglycemia, then there's severe hypoglycemia, which is defined as hypoglycemia resulting in loss of consciousness or confusion or something that requires assistance of another person. So, beyond that, there's the hypoglycemia that we examined, which is the hypoglycemia resulting in actually coming to the hospital. So this is just the tip of the iceberg. You know, at each of those levels, there's more and more hypoglycemia that affects patients, and even the mild hypoglycemia can cause adverse outcomes.

Dr. Anderson:
Okay. So, Scott, let's turn our attention to the results. What were some of the key findings from the study?

Dr. Pilla:
So the main finding is that if we look at the amount of severe hypoglycemia occurring that's resulting in hospitalization, we see that it's happening on average about one event per 100 patients per year, and this is all patients with type 2 diabetes, so this includes patients who are not on medication. This includes all-comers. So that one event in 100 patients might seem low, but it's actually a lot higher if we look at specific subgroups, so it's much higher in people who are on the high-risk medications, especially insulin. So insulin users have over two times the rate of hypoglycemia but often a lot more. The other groups of patients we found who are having much higher rates of hypoglycemia are those who have specific chronic conditions, like chronic kidney disease or cognitive impairment, so they all have a several-fold higher than the baseline rate of hypoglycemia.

A couple other findings that were interesting is that minorities, you know, racial ethnic minorities, have higher rates of hypoglycemia than white patients, and this kind of mirrors some of the other, findings in diabetes that minorities have worse outcomes and are not receiving the same standard of care.

The last finding that we thought was really interesting was that hypoglycemia occurs in patients at all ranges of glycemic control, so there's a thought, you know, out there that hypoglycemia is really only a problem if you tightly control patients, like if they have a low A1C like below 7 or something, but what we found was actually the patients who have the higher risk for hypoglycemia are those that have a low A1C and those that have high A1C. So the takeaway from that is that patients can have hypoglycemia at any level of glycemic control.

Dr. Anderson:
For those just tuning in, you're listening to *Diabetes Discourse* on ReachMD. I'm Dr. John Anderson, and today I'm speaking with Dr. Scott Pilla about his research on hypoglycemia.

Dr. Pilla, let's switch gears a little bit. Let's talk about your second study titled “Hypoglycemia Communication in Primary Care Visits for Patients with Diabetes.” Give us a little background on this study and its initial goals.

Dr. Pilla:
Yeah, absolutely. So one of the key aspects of primary care for patients with diabetes is preventing hypoglycemia from occurring, and we were really interested to understand how primary care doctors are talking to patients about hypoglycemia and how can we get doctors to kind of check all the check boxes that will prevent hypoglycemia from happening.

Dr. Anderson:
So let's talk a little bit about the methodology. What can you tell us about your content analysis approach and sort of the coding

framework that was used for data collection?

Dr. Pilla:
Absolutely. So this was a study that looked at pretty high-risk patients for hypoglycemia. So we looked at 33 patients, their primary care visits over one year, and all of these patients had diabetes and were on high-risk medications. They mostly had type 2 diabetes. One had type 1 diabetes but they were all using sulfonylureas or insulin.

This was a mixed-method study where we combined qualitative methods, where we analyzed audio recordings from primary care visits, and what we did was we reviewed the recordings with two independent reviewers to look at the different types of communication that were occurring around hypoglycemia, and we coded that according to a framework that we developed as part of the study to look at the different aspects of communication around hypoglycemia. So that communication actually broke down into two main categories. One is how clinicians were assessing hypoglycemia. So how are they, you know, talking to patients about whether hypoglycemia was occurring and what the details of their hypoglycemic events were. And the other aspect was communication around prevention for hypoglycemia. So, how are they counseling patients around, you know, what to do to make sure hypoglycemic events don't happen and then, if they do occur, you know, how to treat those events.

Dr. Anderson:
And so, what were some of the key results of this study?

Dr. Pilla:
Yeah, so let me talk about the results broken down by hypoglycemia assessment communication and then hypoglycemia prevention communication. So, as I mentioned, this is a very high-risk group of patients, but in only one quarter of the visits was hypoglycemia really even discussed, so three-quarters of the time, you know, there was really no discussion about hypoglycemia at all. So, in those one-quarter of the visits where hypoglycemia was discussed, we kind of broke it down as to what the discussion was that occurred between the patient and the provider. So the discussion around hypoglycemia really focused on if you had an event and then what caused the event, so what the precipitants of the event were. Some things that were missing from that discussion was, you know, the frequency or severity of the event, which are kind of key predictors of, you know, a patient's risk for having adverse outcomes from hypoglycemia. Another thing that was kind of missing was the effect of the hypoglycemia on patient's quality of life.

In terms of hypoglycemia prevention, that counseling actually occurred even less frequently, so only in 20 percent of visits did the doctor have any sort of counseling around hypoglycemia prevention. And when they did counsel, they really talked a lot about what patients can do with regards to their schedule and their timing of medications for hypoglycemia prevention, but there was also some aspects that were often missing, and a major one of those that I want to draw attention to was not driving with hypoglycemia. Hypoglycemia can cause traffic accidents. It's a pretty common cause of traffic accidents for patients with diabetes, and I think all patients with diabetes should really know that.

Dr. Anderson:
So your study comes from 2009 to 2019, and you know, of course, as well as all our listeners, that there are whole new classes of medications: the GLP-1 receptor agonists, SGLT2 inhibitors, new novel basal insulin analogs that are more physiologic with a little less hypoglycemia, particularly nocturnal hypoglycemia. Do you think we're going to still be dealing with hypoglycemia, especially at the ER and hospitalization level, as we have during the 10 years of your study?

Dr. Pilla:
Yeah, that's a great question. As far as I can tell, hypoglycemia isn't going away, and there's a few reasons for that. I mean, as we saw, one of the findings in my study, was that rates of hypoglycemia were not changing over time even as these new medications were being introduced. The use of newer diabetes medications is going up, but a lot of older adults, you know, either can't take those medications or don't have access to those medications. There are a lot of barriers to getting them sometimes, and, you know, sometimes switching to a new medication can be challenging for doctors and patients. So at least, as of now, the use of insulin and sulfonylureas is pretty high it older patients, it hasn't yet been going down, really. I think that as clinicians we really need to think carefully about the medications that we choose for older patients with diabetes, and if we can switch just to a medication with a better risk/benefit profile, we should encourage our patients to do so.

Dr. Anderson:
That was really well-put. So, before we close, Scott, I'd like to give you the final word. Do you have any takeaways on these studies and the data you've collected on hypoglycemia that you'd like to share with the audience?

Dr. Pilla:
My first takeaway is that hypoglycemia is a major problem in patients with type 2 diabetes, particularly older patients, and it's not going

away. From the first study that I talked about, we can see that some of the most vulnerable patients are those who have the highest risk for hypoglycemia. You know, the patients who are sicker, the patients who are older, the patients who are on high-risk medications, minorities, you know, people with less support, they're the ones that are really suffering these adverse outcomes. They're the ones that need our attention and our prevention efforts the most.

My other takeaway is that in primary care we can do a lot. So most diabetes is actually treated in primary care in the US and not in specialty clinics. Even patients with type 1 diabetes, are often treated in primary care, and primary care doctors, like myself, really have an opportunity to reduce this very preventable harm of treatment, and we have a lot of mechanisms to do so if only we would take the time to ask our patients about it.

You know, patients want to talk about their diabetes treatment and what level of treatment and what medications are best for them. So, we should initiate those discussions, and we should make it a priority in our diabetes visits.

Dr. Anderson:
Really good points. And with those interesting insights in mind, I'd like to thank my guest, Dr. Scott Pilla, for taking us through his research on hypoglycemia in patients with diabetes. Scott, thank you for joining us.

Dr. Pilla:
No, thanks for having me. I appreciate it.

Dr. Anderson:
For ReachMD, I'm Dr. John Anderson. To access this episode and others from our series, visit reachmd.com/diabetesdiscourse, where you can Be Part of the Knowledge. Thanks for listening.